Utlities for Windows

NVIDIA nTune Generation 5.0 User's Guide

Version 2.0

NVIDIA Corporation
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CHAPTER 1

ABOUT NVIDIA NTUNE GENERATION 5.0

NVIDIA nTune™ Generation 5.0 is a full-featured application that lets you easily modify system settings and test them without having to reboot your system.

With NVIDIA nTune, you can

- Modify system performance settings, such as bus speeds, CPU voltages, fan speed, and other system performance options that are supported by the BIOS
- Save the modifications to a profile so that you can quickly apply settings to suit specific application environments
- Monitor hardware temperature, voltage, timing, and fan speed
- View other information about your system, such as hardware and software revisions and other capabilities

This document applies to all versions of NVIDIA nTune within NVIDIA nTune Generation 5.0. The following sections in this chapter introduce NVIDIA nTune:

- "System Requirements" on page 2
- "Installing NVIDIA nTune" on page 3

System Requirements

- Supported Operating Systems:
  - Microsoft Windows® XP (32-bit and 64-bit)
  - Microsoft Windows® Vista™
- Supported Motherboards:

  NVIDIA nTune version 5.0 supports only motherboards with nForce processors, with the exception of the following:
  - nForce1
  - nForce mobile edition processors
  - nForce server class processors

  NVIDIA nTune version 5.05 and later supports all motherboards, not just motherboards with nForce processors, for the following features:
  - GPU overclocking and fan control using the nTune Performance page in the NVIDIA Control Panel
  - System performance monitoring and GPU temperature monitoring using the nTune NVIDIA Monitor
- Supported Processors
  - All AMD K7 (except Duron) processors
  - AMD Athlon 64 FX processors
  - AMD Opteron processors
  - AMD Sempron processors
  - Intel® Pentium® 4 processor with Hyperthreading support

Note: nTune does not support overclocking, underclocking, or performance auto-tuning on multi-processor systems.

Installing NVIDIA nTune

Before You Begin

- Make sure your hardware meets the "System Requirements" on page 2.

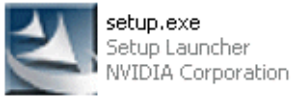
  For nTune 5.0, the installer will not install NVIDIA nTune on non-supported systems, including non-supported nForce-based motherbaords.

  nTune 5.05 and later will install on all motherboards.

- Uninstall any previous versions of NVIDIA nTune or NVIDIA System Utility before installing the latest version.

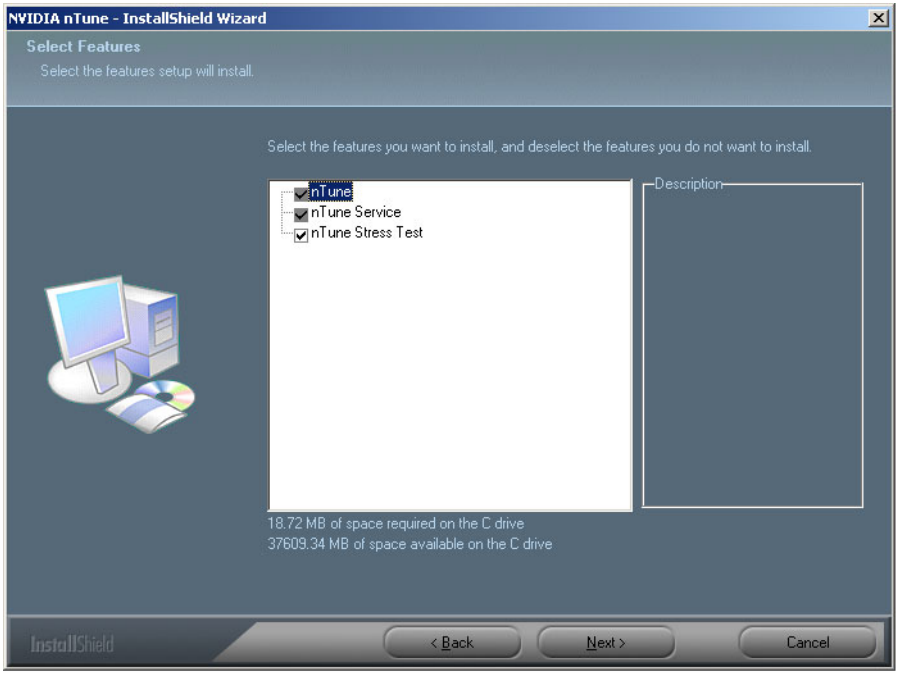
Installation Instructions

1. Download the zip file, then unzip to a temporary folder.
2. Double-click **Setup** from your temporary folder.

   The InstallShield Wizard starts, and directs you through the rest of the installation process as described below.
3. At the Welcome window, click **Next**.
4. Read the license agreement, then click **Yes** if you agree to the terms.

5 At the Select Features screen, select all the nTune features and then click **Next**.


NVIDIA nTune - InstallShield Wizard
Select Features
Select the features setup will install.
Select the features you want to install, and deselect the features you do not want to install.
nTune
nTune Service
nTune Stress Test
Description
18.72 MB of space required on the C drive
37609.34 MB of space available on the C drive
InstallShield
< Back
Next >
Cancel

6 At the Choose Destination Location window, browse to locate the folder where you want the NVIDIA nTune files installed, or just use the default location and click **Next**.

Setup proceeds to install the files.

7 At the InstallShield Wizard Complete window, click **Finish**.

CHAPTER

2

USING NVIDIA NTUNE GENERATION 5.0

This chapter provides basic instructions for starting and using nTune 5.0. It contains the following sections:

- "Starting NVIDIA nTune" on page 6
- "Quick Start/Reference Guide to Using nTune" on page 9
- "Overview of Other Menu Options" on page 13

Starting NVIDIA nTune

You can start NVIDIA nTune in several ways:

- From the Windows desktop, click **Start**, then click **All Programs**->**NVIDIA Corporation**->**NVIDIA Control Panel-> Performance**, or
- Right-click the Windows desktop, click NVIDIA Control Panel from the pop-up menu, then from the **Select a Category** page, click **Performance**, or
- From the Windows Control Panel, double-click the NVIDIA Control Panel icon, then from the **Select a Category** page, click **Performance**.

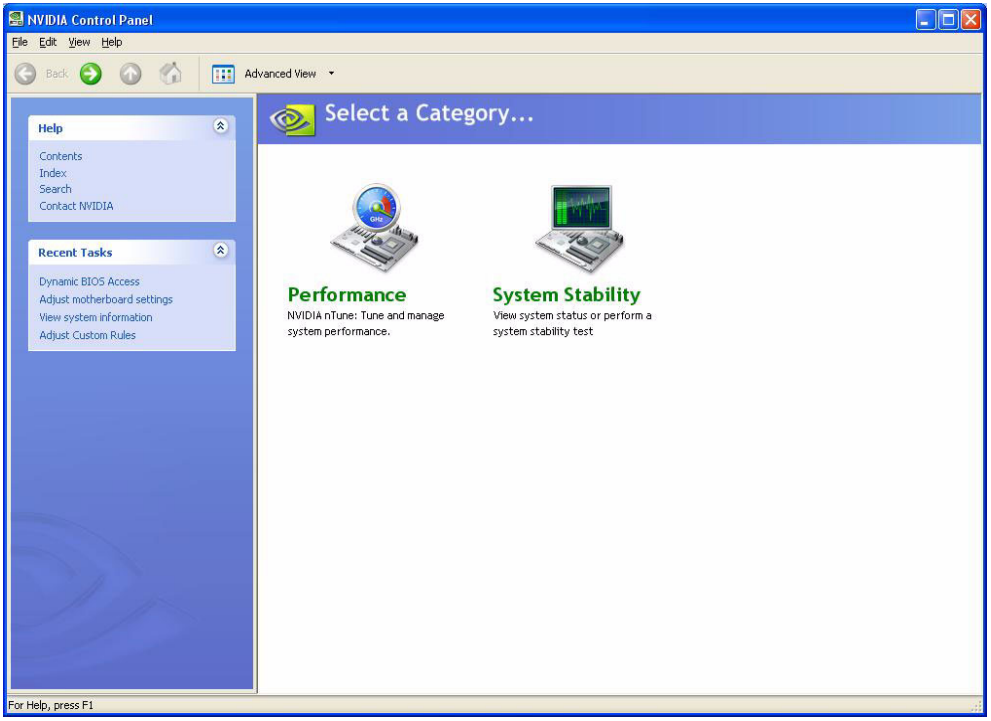


Figure 2.1 nTune Performance Icon in the NVIDIA Control Panel

IMPORTANT!

Depending on your motherboard settings, the following warning message may appear when nTune starts:

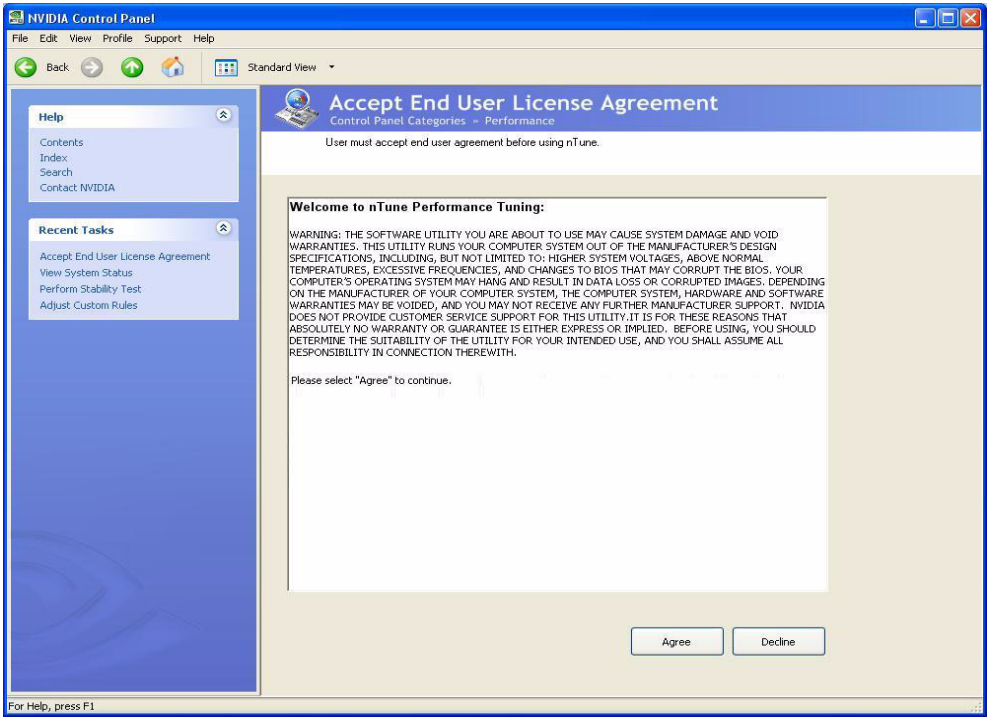
> ***Warning: Your PCI clock is currently set to track the HT bus. If you adjust the clock for the HT bus, the PCI bus clock will change as well. Please consult your motherboard manual to determine how to disable this behavior before proceeding.***

If this warning appears, follow the directions from the motherboard manufacturer to enter the BIOS Setup and disable the Spread Spectrum features.

NVIDIA is not responsible for data loss or hardware damage resulting from ignoring this warning message.

Accepting the End User License Agreement

After selecting the Performance icon, the user must select "Accept End User License Agreement" link and agree to the EULA to begin using nTune.


NVIDIA Control Panel
File Edit View Profile Support Help
Back
Standard View
Help
Contents
Index
Search
Contact NVIDIA
Recent Tasks
Accept End User License Agreement
View System Status
Perform Stability Test
Adjust Custom Rules
Accept End User License Agreement
Control Panel Categories » Performance
User must accept end user agreement before using nTune.
Welcome to nTune Performance Tuning:
WARNING: THE SOFTWARE UTILITY YOU ARE ABOUT TO USE MAY CAUSE SYSTEM DAMAGE AND VOID WARRANTIES. THIS UTILITY RUNS YOUR COMPUTER SYSTEM OUT OF THE MANUFACTURER'S DESIGN SPECIFICATIONS, INCLUDING, BUT NOT LIMITED TO: HIGHER SYSTEM VOLTAGES, ABOVE NORMAL TEMPERATURES, EXCESSIVE FREQUENCIES, AND CHANGES TO BIOS THAT MAY CORRUPT THE BIOS. YOUR COMPUTER'S OPERATING SYSTEM MAY HANG AND RESULT IN DATA LOSS OR CORRUPTED IMAGES. DEPENDING ON THE MANUFACTURER OF YOUR COMPUTER SYSTEM, THE COMPUTER SYSTEM, HARDWARE AND SOFTWARE WARRANTIES MAY BE VOIDED, AND YOU MAY NOT RECEIVE ANY FURTHER MANUFACTURER SUPPORT. NVIDIA DOES NOT PROVIDE CUSTOMER SERVICE SUPPORT FOR THIS UTILITY.IT IS FOR THESE REASONS THAT ABSOLUTELY NO WARRANTY OR GUARANTEE IS EITHER EXPRESS OR IMPLIED. BEFORE USING, YOU SHOULD DETERMINE THE SUITABILITY OF THE UTILITY FOR YOUR INTENDED USE, AND YOU SHALL ASSUME ALL RESPONSIBILITY IN CONNECTION THEREWITH.
Please select "Agree" to continue.
Agree
Decline
For Help, press F1

About the nTune Performance Page

nTune Generation 5.0 is incorporated into the new intuitive NVIDIA Control Panel design. Explanations of the various pages are provided within the page, so this manual focuses on providing an overview of the functions available with nTune 5.0.

Figure 2.2 shows the nTune Advanced View.

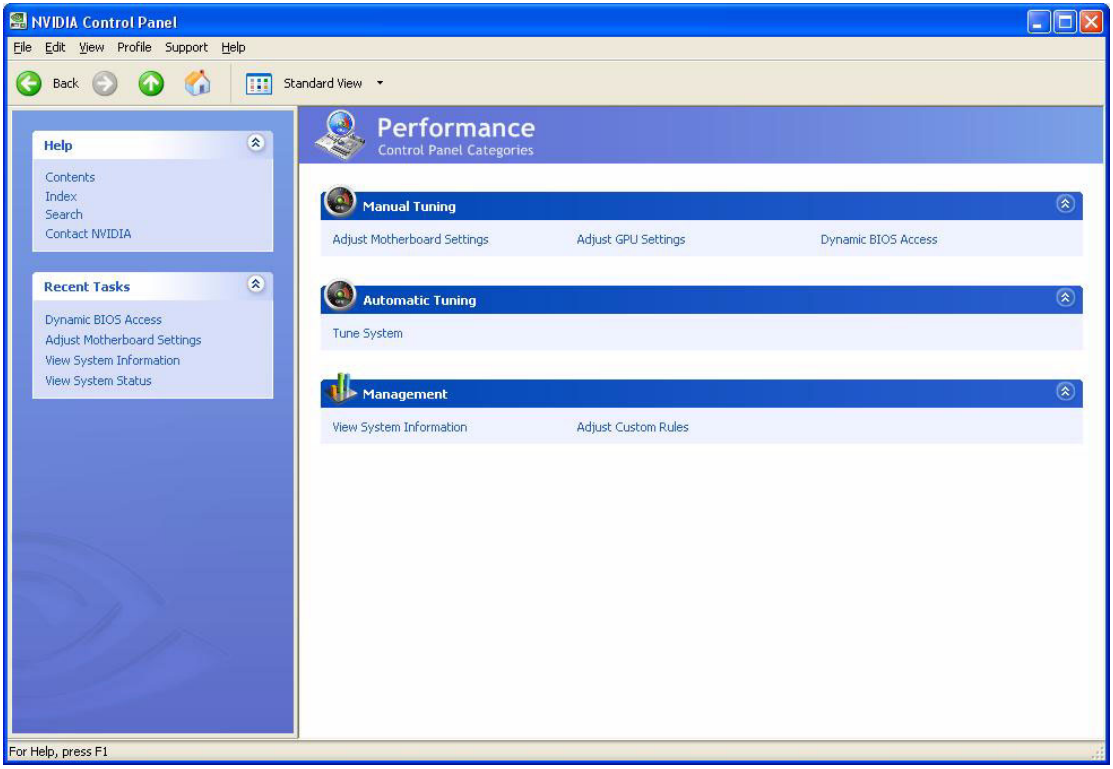


Figure 2.2 nTune Advanced View

Quick Start/Reference Guide to Using nTune

This section provides a quick reference for accomplishing the following nTune tasks:

- Tuning Your System for Optimum Performance
- Monitoring Your System Performance
- Overclocking Your System and Adjusting Voltage and Fan Speed
- Dynamic BIOS Access

Tuning Your System for Optimum Performance

You can use the NVIDIA developed tuning engine to automatically overclock and increase the performance level of the system.

1. Automatic Tuning

The nTune tuning engine runs internal benchmark tests on your system and creates performance profiles. Use the profiles to actually adjust your system performance.

- From the Automatic Tuning section of the Control Panel Performance page, click **Tune System.**

  See "Tuning Your System Automatically" on page 16 for detailed information about automatically tuning the system.

2. Specify how to use the profiles

Create Rules for how the profiles are used–

- From the System Performance section of the Control Panel Performance page, click **Adjust Custom Rules**.

Monitoring Your System Performance

NVIDIA Monitor is an application that displays dynamic graphs that track the CPU and system temperatures, and the voltages and speeds for various hardware components.

- To start NVIDIA Monitor and manage various NVIDIA Monitor settings, from the Windows desktop, click **Start**, then click **All Programs**->**NVIDIA Corporation**- and then click **NVIDIA Monitor**.

See Chapter 4, "Monitoring and Logging System Events" on page 23 for more information about NVIDIA Monitor.

Overclocking Your System and Adjusting Voltage and Fan Speed

Overclocking Your System

To overclock you system, click **Adjust Motherboard Settings** from the Manual Tuning section of the Control Panel Performance page.

See Chapter 5, "Supplemental Information for the Adjust Motherboard Settings Page" on page 29 for more information.

Changing System Component Voltages

To change the voltages of specific system components, click **Adjust Motherboard settings** from the Manual Tuning section of the Control Panel Performance page.

Access to these adjustments requires BIOS support from the motherboard manufacturer.

Note: For nTune Generation 2.0 and higher, the maximum CPU voltage level is limited to 2.0 volts.

- **Hints:**

  When overclocking the system, it may be desirable to increase the voltage level of the components to provide more operating margin.

- **Cautions:**

  Increasing the voltage or the clock speed of a component may void its warranty due to exceeding recommended specifications. NVIDIA and the board manufacturer are **not** responsible for damage that may occur when component tolerances are exceeded.

All changes made to the **Adjust Motherboard Settings** page take effect immediately after selecting **Apply** or **OK**; however, these setting will only remain active for the current Windows session. This will allow a user to safely return to Windows in the event of a crash, without any possibility of boot issues since the changes are not made directly to the BIOS settings.

Changing Fan Speeds

To control the CPU fan speed as well as the speed of auxiliary fans, click **Adjust Motherboard Settings** from the Manual Tuning section of the Control Panel Performance page.

Access to these adjustments requires BIOS support from the motherboard manufacturer.

- **Range:** "Off" to "Max", with incremental steps defined by the specific fan.

- **Caution:**

  It is not recommended that these fans be disabled or slowed down, unless adequate cooling measures are in place. NVIDIA and the board manufacturer are **not** responsible for thermal overload damage resulting from manipulation of the fan speed.

All changes made on the **Adjust Motherboard Settings** page take effect immediately after selecting **Apply** or **OK**; however, these setting will only remain active for the current Windows session. This will allow a user to safely return to Windows in the event of a crash, without any possibility of boot issues since the changes are not made directly to the BIOS settings.

Dynamic BIOS Access

This feature is available only with BIOS support from the motherboard manufacturer.

To manage system BIOS settings,

1. Click **Dynamic BIOS Access** from the Manual Tuning section of the Control Panel Performance page.

2. In the **Dynamic BIOS Access** page, click the **Available BIOS Pages** list arrow and click the BIOS page that you want to edit.

   The BIOS page chosen determines which items on the page are available for changing.

3. To edit an item, click the corresponding list arrow and then click one of the values from the list.

4. When finished making your changes, click the **OK** or **Apply**.

   The changes do not go into effect until after you reboot your system.

Since these changes are made to actual BIOS settings in the CMOS, the settings remain active until you change them again or restore the CMOS to the default settings.

Overview of Other Menu Options

Save Profiles

From the NVIDIA Control Panel main menu, click **Profile** -> **Save** to save the current changes to a new profile.

Choose or name the `.nsu` file from the Save As dialog box, then click **Save**.

Load Profiles

From the NVIDIA Control Panel main menu, click **Profile** -> **Load** to load nTune settings from a profile (`.nsu` file) directly.

Get Technical Support

From the NVIDIA Control Panel main menu, click **Support** -> **Support website** to open the NVIDIA technical support web site in your browser.

CHAPTER 3

AUTOMATICALLY TUNE PERFORMANCE AND ADJUST CUSTOM RULES

This chapter describes the various options available when performing the following tasks:

- "Tuning Your System Automatically" on page 16
- "Adjusting and Creating Custom Rules" on page 20

Tuning Your System Automatically

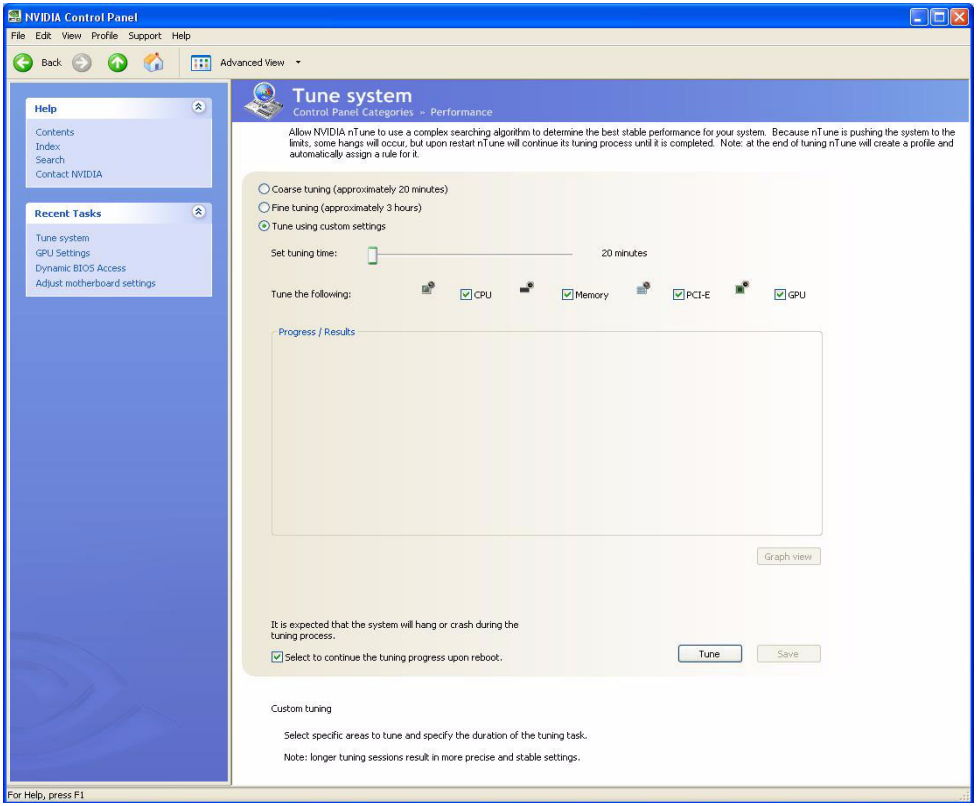
The NVIDIA tuning engine lets you tune the system using NVIDIA developed benchmarks to determine the current performance level of the system. You can also tune the system to various performance criteria. The tuning takes effect during the current Windows session only. To use the tuned settings in future Windows sessions, you can create a profile.

Close all applications and save all work before performing any benchmarking tests or tuning processes.

Automatic Tuning

1 From the nTune Performance page, click **Tune System**.

The Tune System page appears.


NVIDIA Control Panel
File Edit View Profile Support Help
Back
Advanced View
Help
Contents
Index
Search
Contact NVIDIA
Recent Tasks
Tune system
GPU Settings
Dynamic BIOS Access
Adjust motherboard settings
Tune system
Control Panel Categories » Performance
Allow NVIDIA nTune to use a complex searching algorithm to determine the best stable performance for your system. Because nTune is pushing the system to the limits, some hangs will occur, but upon restart nTune will continue its tuning process until it is completed. Note: at the end of tuning nTune will create a profile and automatically assign a rule for it.
Coarse tuning (approximately 20 minutes)
Fine tuning (approximately 3 hours)
Tune using custom settings
Set tuning time:
20 minutes
Tune the following:
CPU
Memory
PCI-E
GPU
Progress / Results
Graph view
It is expected that the system will hang or crash during the tuning process.
Select to continue the tuning progress upon reboot.
Tune
Save
Custom tuning
Select specific areas to tune and specify the duration of the tuning task.
Note: longer tuning sessions result in more precise and stable settings.
For Help, press F1

2 Select a tuning type.

3 Select **Tune**.

During the course of tuning, the system may stop responding or reboot. NVIDIA recommends checking **Automatically continue at reboot ...** to disable prompts on reboot during the tuning process.

- A progress bar shows the tuning progress.
- You can cancel at any time by clicking **Stop**.
- The tuning results appear in the Results box as a text description of the number of passes and adjustments made. To view a graph of the results, click **Graph View**.

  The effects of the tuning apply to the current Windows session only.

4 To use the tuned settings in another Windows session,

a Click **Save** to save the tuned settings in a profile (`.npe`)

b When needed, click **Load** to load the tuned settings.

Understanding the Tuning Options

This section explains the tuning process for each of the tuning options.

Quick

The Quick tuning option tunes your system automatically and takes approximately 20 minutes.

The process involves adjusting (where applicable) the FSB, Memory bus, AGP bus, PCI-E bus, GPU Core clock, and GPU Memory bus.

Two profiles are generated as follows:

- `Default.npe` - The current bus speeds are saved in this profile.
- `Bestsystem.npe` - nTune increases the bus speeds and runs the micro-benchmark until the highest passing settings are reached. The resulting settings are saved in this profile.

Complete

The Complete tuning option tunes your system automatically and takes approximately 3 hours.

The process involves adjusting (where applicable) the FSB, Memory bus, AGP bus, PCI-E bus, GPU Core clock, GPU Memory bus, memory timing registers, and hardware-specific performance tuning registers.

The Complete process creates the same default and best system files as does the Quick process, but the process is more complex so it may require additional cycles.

Custom

The Custom option lets you control the tuning process.

Running the Tune Process

Important: *All dynamic overclocking features in the BIOS must be disabled before tuning.*

1 Select the method you want to run.

- **CPU Only**

  This method uses the CPU benchmark to perform an iterative process to determine which settings provide the best CPU performance. This is done without consideration of the other performance areas.

- **Memory Only**

  This method uses the memory benchmark to perform an iterative process to determine which settings provide the best memory performance. This is done without consideration of the other performance areas.

- **PCI-E Only**

  This method uses the graphics benchmark to perform an iterative process to determine which settings provide the best PCI-E performance. This is done without consideration of the other performance areas.

- **Graphics Only**

  This method uses the graphics benchmark to perform an iterative process to determine which settings provide the best graphics performance. This is done without consideration of the other performance areas.

  Graphics tuning requires NVIDIA GeForce FX or better to execute.

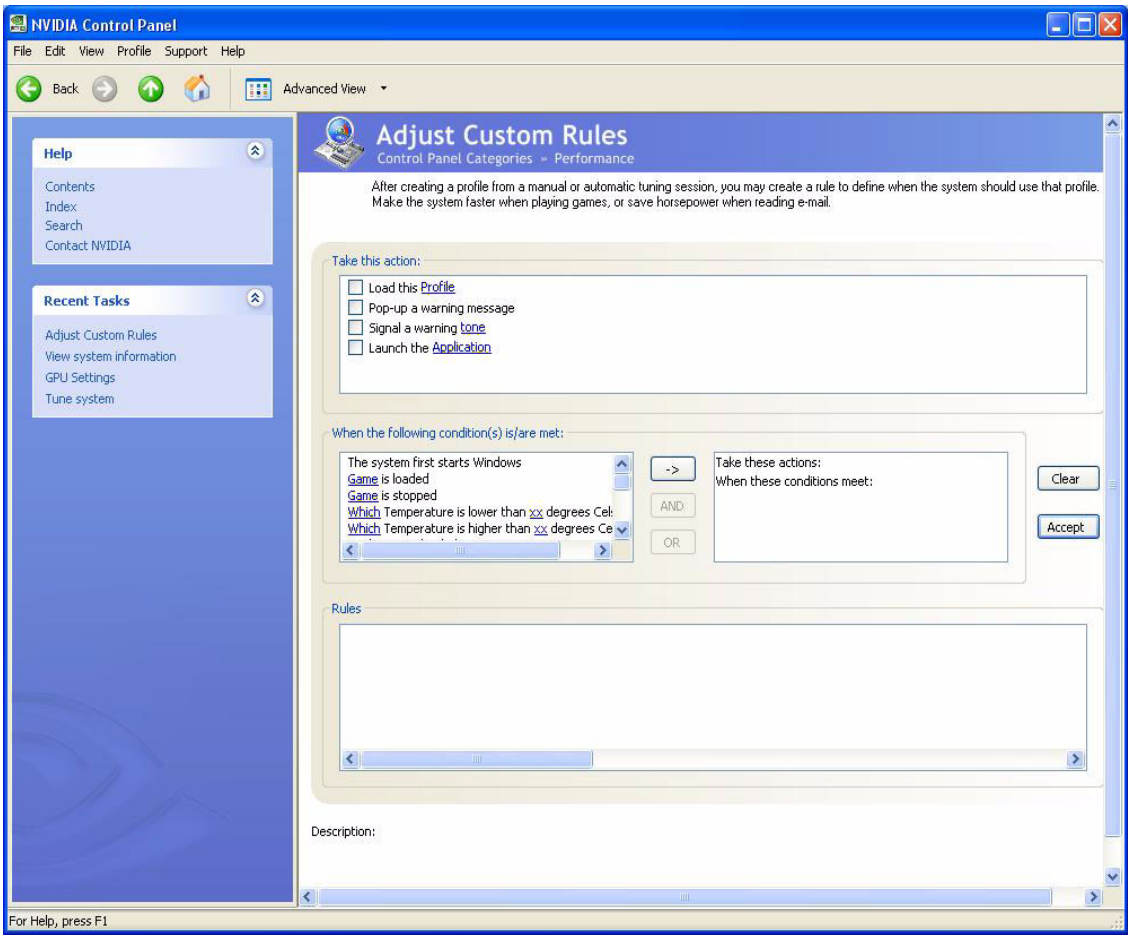
2. During the course of tuning, the system may stop responding or reboot. If you want the tuning process to restart when the system is restarted and continue from the last good test, then check **Automatically continue at reboot.**

3. Select a **Tuning time**.

Adjusting and Creating Custom Rules

NVIDIA nTune allows you to create rules for how the system uses nTune profiles (`.nsu` files or `.npe` files). After you create the rule, the system will select an enabled profile automatically according to the criteria set up within the rule(s).

1 To create rules from the nTune Performance page, click **Adjust Custom Rules**.



2 From the **Take this action** section, select an action from the list provided.

Note: Blue underlined text may be selected to set parameters.

- **Load this** Profile: Select to load a specific profile. When the "Profile" link is selected, an Explorer window will be opened to allow for the search of nTune profiles that have been created previously.
- **Pop-up a warning message**: Select to display a default NVIDIA warning message.
- **Signal a warning** tone: Select to play a specific .WAV file as a warning. When the "tone" link is selected, an Explorer window will be opened to allow for the search of .WAV files.
- **Launch an** Application: Select to launch a specific application. When the "Application" link is selected, an Explorer window will be opened to allow for the search of application files.

3 From the **When the following condition(s) is/are met** section, select a condition from the list provided.

When this condition or conditions are met, the action selected will take effect.

Note: Blue underlined text may be selected to set parameters.

- Game **is loaded / stopped**: When the specified game is loaded or stopped, the previously defined action will occur. The "Game" selection will open a game list and allow the searching for new games not listed.
- Which **temperature is lower/higher than** xx **degrees Celsius**: When the specific temperature is reached, the previously defined action will occur. The "Which" selection allows the source or the temperature to be defined as CPU, system, or GPU. The "xx" selection allows the input of the actual trigger temperature.
- **Any Direct 3D application loads**: When any 3D application loads, the previously defined action will occur.
- **Any OpenGL application loads**: When any OpenGL application loads, the previously defined action will occur.
- **Any DVD is playing**: When any DVD is playing, the previously defined action will occur.
- **CPU is idle (power savings)**: When the CPU is idle for more than 30 seconds, the previously defined action will occur.
- **CPU is active (performance)**: When the CPU is active for more than 30 seconds, the previously defined action will occur.

4 Use the following buttons and controls as needed:

- Click "**->**" to add conditions to the rule.
- Use the "**AND**" and "**OR**" buttons to make more complex rules by logically grouping conditions together.
- Use **Clear** to remove a rule in process of being created.
- Use **Accept** to accept a newly created rule and begin using it. The newly accepted rule will appear in the "Rules" list.
- The **Rules** box shows a list of rules defined. If selected, a rule is being used for system operation. To disable, uncheck the rule. The rules may be deleted using the <**Delete**> key.

CHAPTER

4

MONITORING AND LOGGING SYSTEM EVENTS

This chapter describes how to set up and use the NVIDIA Monitor application for monitoring and logging system events.

It contains the following sections:

- "About NVIDIA Monitor" on page 24
  describes the NVIDIA Monitor application features.
- "Adjusting NVIDIA Monitor Settings" on page 26
  explains how to specify various NVIDIA Monitor options.
- "Logging Events" on page 28
  explains how to use NVIDIA Monitor to log events to a log file.

About NVIDIA Monitor

NVIDIA Monitor can display dynamic graphs that track various performance usage and temperatures, and the voltages, fan speeds, and bus speeds for various hardware components.

To open NVIDIA Monitor,

- From the Windows desktop, click **Start**, then click **All Programs**->**NVIDIA Corporation**-then select **NVIDIA Monitor**

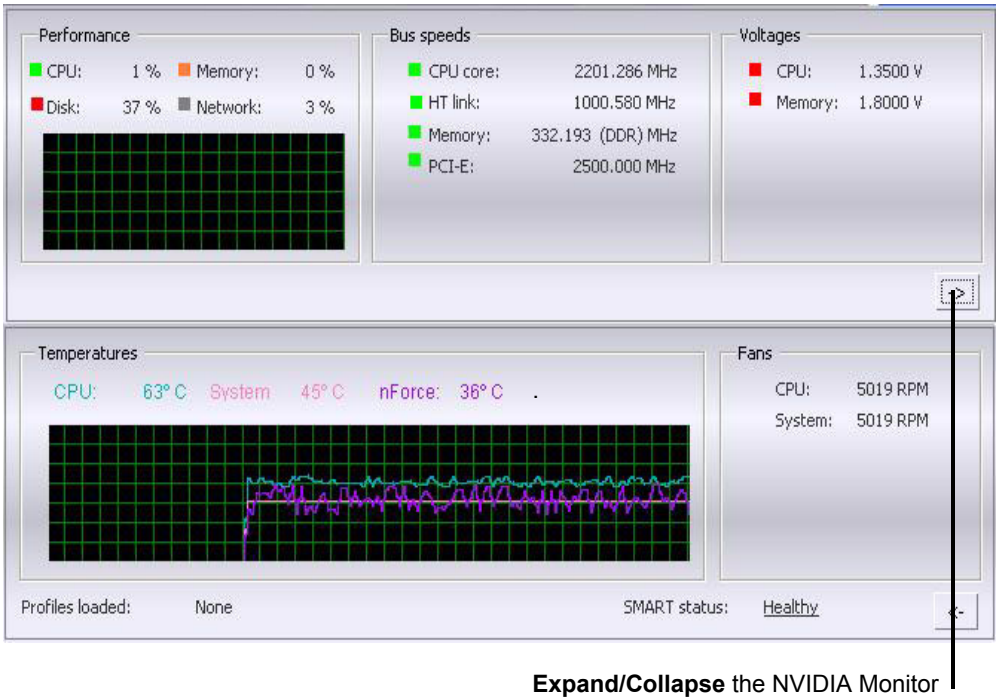


Figure 4.1 NVIDIA Monitor

Temperatures

The temperature graphs reflect the temperature level reported by the BIOS. Right click to select settings to make adjustments to

- Specify the temperature units—either degrees Celsius or Fahrenheit.
- Pick a method for alerting when the temperature reaches the overtemp limit—either using flashing text or by outputting an audible warning tone.
- Specify which component temperatures to track and display.

See "Adjusting NVIDIA Monitor Settings" on page 26.

Voltages

The voltages are displayed as set or measured voltage levels depending on the BIOS implementation. If the BIOS does not support reporting the voltages, "Not reported" appears to the right of the "**Voltages (in volts):**" text.

The colored boxes indicate the level of safety at which each component is operating, and are defined as follows:

- Green: Safe operating level
- Yellow: Warning - May result in system instability
- Red: Danger - Will likely result in system instability or component damage.

Speeds

The operating speed for various components is indicated by bar graph.

The colored boxes indicate the level of safety at which each component is operating, and are defined as follows:

- Green: Safe operating level
- Yellow: Warning - May result in system instability
- Red: Danger - Will likely result in system instability.

Current Profile

Displays the name of the nTune or Performance Examiner profile currently in use by the system.

Adjusting NVIDIA Monitor Settings

To customize various NVIDIA Monitor settings, right-click the NVIDIA Monitor and select **Settings**.

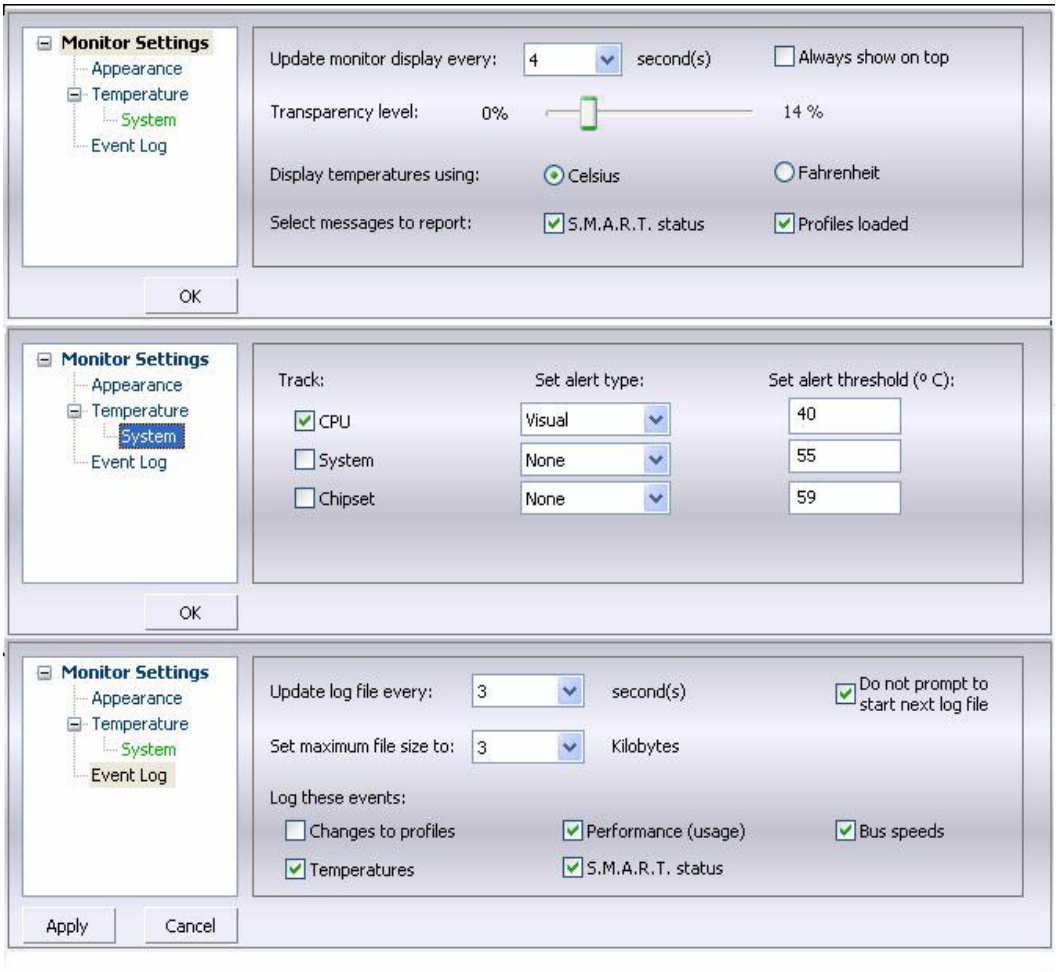


Figure 4.2 Adjust NVIDIA Monitor Settings Page

NVIDIA Monitor Appearance

Specifying the Temperature Reading Interval

To specify how often to update the temperature values, click the **Update** list arrow and then click one of the polling intervals from the list.

Note: Because of SMI traffic and CPU utilization, faster polling times may impact performance. This may be particularly noticeable when playing WAV files.

Specifying a Viewing Option

To always display the NVIDIA Monitor application in the foreground while running other tasks, select the **Always on top** check box.

Because this can hide items in the background, you can adjust the transparency of NVIDIA Monitor up to 80% by moving the **Transparency Level** slider.

The greater the percentage, the more transparent the NVIDIA Monitor appearance

Tracking Temperatures

- **Specifying the temperatures to track**

  Select the check boxes of the components that you want to track— CPU, System, GPU, GPU2, and CPU2 temperatures. If unavailable, the check box is grayed-out.

  Note: GPU temperature tracking requires ForceWare Release 55 or later graphics drivers and GeForce FX or greater graphics cards.

- **Specifying the Temperature Scale to Use**

  Choose which temperature scale to use—Celsius or Fahrenheit.

- **Specifying the Overtemp Alert Method**

  You can specify how the system alerts you when a measured temperature exceeds the limit specified in the BIOS–either with a visual or audio alert.

Logging Events

Adjusting Event Logging Settings

1. Specify how often to track the selections.

   Under **Log file settings**, either leave the default setting or click the **Update timer** list arrow and click the time interval—in seconds—that you want.

2. Specify the maximum file length.

   Under **Log file settings**, either leave the default setting or click the **Max length** list arrow and click from the file lengths—in kilobytes—that you want.

   NVMonitor starts a new log file when the maximum file length of the current log file is reached.

3. Under **Log these events**, check one or more of the items that you want to track—profile changes, bus speeds, and temperature.

Launching the Event Logger

- To start logging, click **Launch NVIDIA Monitor** and then right click and select **Start event logging**.
- To view a log file, right click and select **View event log** to open Windows Explorer where you can locate the log file that you want to view.

CHAPTER 5

SUPPLEMENTAL INFORMATION FOR THE ADJUST MOTHERBOARD SETTINGS PAGE

This chapter provides supplemental information to keep in mind when adjusting system timings using the **Adjust Motherboard Settings** page.

All changes made on this page take effect immediately after selecting **Apply** or **OK**; however, these setting will remain active only for the current Windows session. Because the changes are not made directly to the BIOS, you can safely return to Windows in the event of a crash, without any possibility of boot issues.

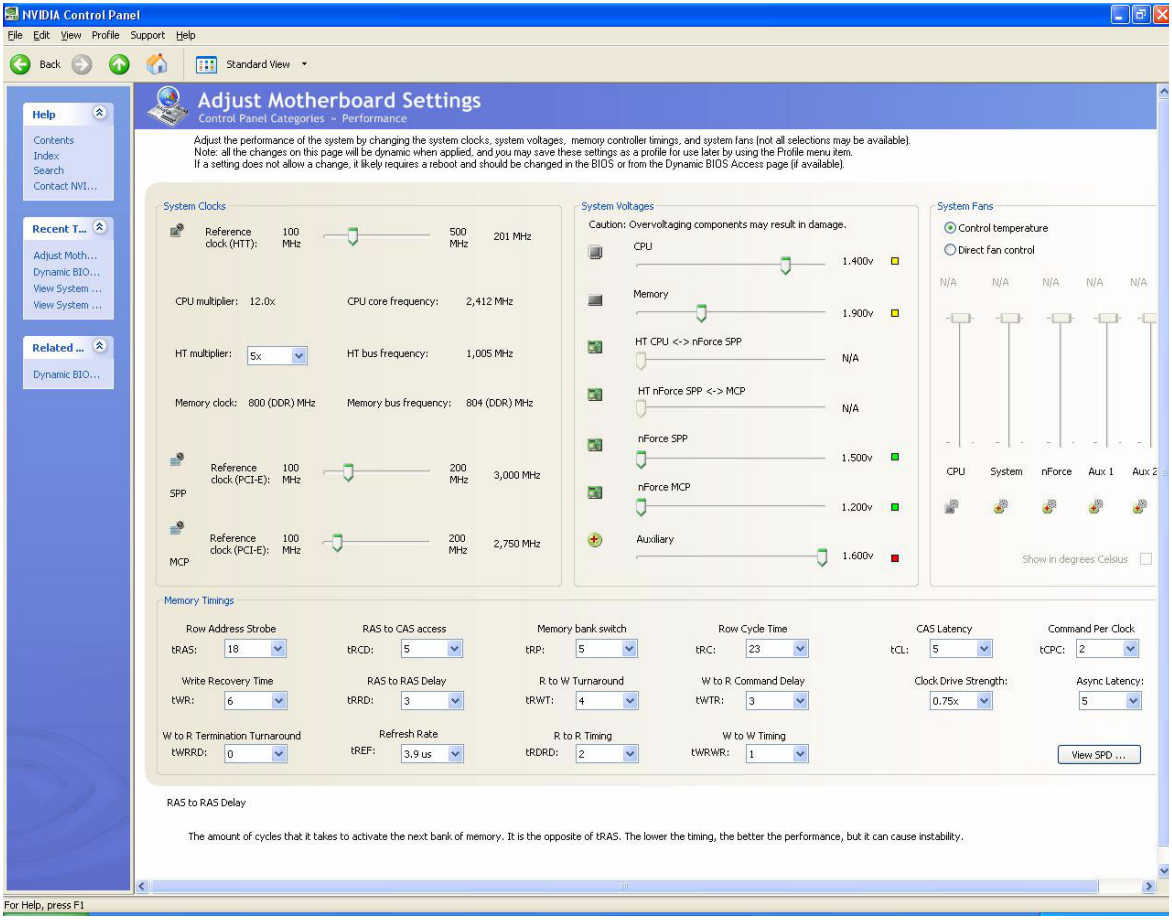

NVIDIA Control Panel
File Edit View Profile Support Help
Back
Standard View
Help
Contents
Index
Search
Contact NVI...
Recent T...
Adjust Moth...
Dynamic BIO...
View System ...
View System ...
Related ...
Dynamic BIO...
Adjust Motherboard Settings
Control Panel Categories » Performance
Adjust the performance of the system by changing the system clocks, system voltages, memory controller timings, and system fans (not all selections may be available).
Note: all the changes on this page will be dynamic when applied, and you may save these settings as a profile for use later by using the Profile menu item.
If a setting does not allow a change, it likely requires a reboot and should be changed in the BIOS or from the Dynamic BIOS Access page (if available).
System Clocks
Reference clock (HTT): 100 MHz 500 MHz 201 MHz
CPU multiplier: 12.0x
CPU core frequency: 2,412 MHz
HT multiplier: 5x
HT bus frequency: 1,005 MHz
Memory clock: 800 (DDR) MHz
Memory bus frequency: 804 (DDR) MHz
Reference clock (PCI-E): 100 MHz 200 MHz 3,000 MHz
SPP
Reference clock (PCI-E): 100 MHz 200 MHz 2,750 MHz
MCP
System Voltages
Caution: Overvoltaging components may result in damage.
CPU 1.400v
Memory 1.900v
HT CPU <-> nForce SPP N/A
HT nForce SPP <-> MCP N/A
nForce SPP 1.500v
nForce MCP 1.200v
Auxiliary 1.600v
System Fans
Control temperature
Direct fan control
N/A N/A N/A N/A N/A
CPU System nForce Aux 1 Aux 2
Show in degrees Celsius
Memory Timings
Row Address Strobe tRAS: 18
RAS to CAS access tRCD: 5
Memory bank switch tRP: 5
Row Cycle Time tRC: 23
CAS Latency tCL: 5
Command Per Clock tCPC: 2
Write Recovery Time tWR: 6
RAS to RAS Delay tRRD: 3
R to W Turnaround tRWT: 4
W to R Command Delay tWTR: 3
Clock Drive Strength: 0.75x
Async Latency: 5
W to R Termination Turnaround tWRRD: 0
Refresh Rate tREF: 3.9 us
R to R Timing tRDRD: 2
W to W Timing tWRWR: 1
View SPD ...
RAS to RAS Delay
The amount of cycles that it takes to activate the next bank of memory. It is the opposite of tRAS. The lower the timing, the better the performance, but it can cause instability.
For Help, press F1

Figure 5.1 nTune Adjust Motherboard Settings Page

System Clocks Group

The System Clocks section provides clocking control of the reference clock for the Hypertransport Technology bus (HTT) or the front side bus (FSB), HT multiplier, memory bus, and the reference clock for the AGP or PCI-Express bus.

Hints and Cautions

- **Hints**:
  - When overclocking the system, it may be advantageous to increase the voltage level of the components to provide more operating margin.
  - For higher front side bus and memory bus adjustments, NVIDIA recommends increasing (relaxing) the memory timings to improve stability.
  - For higher front side bus and memory bus adjustments, NVIDIA recommends decreasing the CPU multiplier to improve stability.
- **Caution:**

  Increasing the voltage or the clock speed of a component may void its warranty due to exceeding recommended specifications. NVIDIA and the board manufacturer are **not** responsible for damage that may occur when component tolerances are exceeded.

System Clock Settings

Reference Clock (HTT) or (FSB)

Use this slider to control the reference clock rate of the HTT bus or FSB, which will also change the CPU core and memory bus frequencies. The "actual frequency" (shown at the right of the slider) will change as the slider is moved.

CPU Multiplier

The two values that determine the speed of the processor are the HTT bus (or FSB in some cases) frequency and CPU multiplier. The CPU multiplier is not a dynamic setting. The current multiplier setting is shown and may be changed in the BIOS setup or from the Dynamic BIOS Access page (if available).

HT Multiplier

Use in combination with the reference clock (HTT) to define the FSB speed, in most cases.

Reference Clock (AGP or PCI-Express)

- Reference clock (AGP)

  Use this slider to control the AGP bus speed. Higher frequencies create higher performance, but may not be as stable. This selection is not available on PCI-E configurations.

- SPP Reference clock (PCI-E)

  Use this slider to control the SPP PCI-Express bus speed for the x16 slot. Higher frequencies create higher performance, but may not be as stable. This option may not be available on all configurations.

- MCP Reference clock (PCI-E)

  Use this slider to control the SPP PCI-Express bus speed for the x16 slot. Higher frequencies create higher performance, but may not be as stable.

Memory Controller Timing Group

The memory controller timing section lets you control essential timings in order to maintain stability when overclocking the front side bus and memory bus. Increasing (relaxing) these parameters should allow for increased margins when performing overclocking functions.

- Row Address Strobe (tRAS)

  This is the amount of time between a row being activated by precharge and then deactivated. The shorter the time, the faster the performance, but if it is set too low, it can cause data corruption.

- RAS to CAS Access (tRCD)

  This is the amount of time, in cycles, between issuing an active command and then issuing the read/write commands.

- Memory Bank Switch (tRP)

  This is the minimum time between active commands and the read/writes of the next bank on the memory module.

- Row Cycle Time (tRC)

  This is the minimum time, in cycles, that it takes a row to complete a full cycle. This can be determined by tRC = tRAS + tRP. If this is set too low it can cause corruption of data. If it is too high, it will increase stability but cause a loss in performance.

- Write Recovery Time (tWR)

  This is the memory timing that determines the delay between a write command and a precharge command sent to the same bank of memory.

- RAS to RAS Delay (tRRD)

  This is the amount of cycles that it takes to activate the next bank of memory. It is the opposite of tRAS. The lower the timing, the better the performance, but it can cause instability.

- Read to Write Delay (tRWT)

  When a write command is received, this is the amount of cycles for the command to be executed.

- Write to Read Delay (tWTR)

  This is the amount of cycles required between a valid write command and the next read command. Lower values result in better performance, but can cause instability.

- Write to Read Time (tWRRD)

  This is the number of clock cycles between the last write data pair and the subsequent READ command to the same physical bank.

- Write to Write Time (tWRWR)

  This is the number of clock cycles between the last write and the subsequent WRITE command to the same physical bank.

- Read to Read Time (tRDRD)

  This is the number of clock cycles between the last read and the subsequent READ command to the same physical bank.

- Refresh Timing (tREF)

  This is the amount of time, in microseconds(μs), it takes before a charge is refreshed so it does not lose its charge and become corrupted.

The following settings require a reboot and must be set in the BIOS Setup or using the Dynamic BIOS Access page if available.

- Command Per Clock (tCPC)

  This is the amount of time in cycles between when the chip select is executed and when the commands can be issued. A lower value (1T) results in faster performance, but 2T is used to maintain system stability.

- Column Address Strobe (tCAS)

  This controls the amount of time in cycles between sending a reading command and acting on it. From the beginning of the CAS to the end of the CAS is the latency. The lower the time, in cycles, the higher the memory performance.